Mathematical analysis II — Tutorial 1

`http://kam.mff.cuni.cz/~tereza/teaching.html`

Problem 1: Find Taylor series of the following functions at 0, where does the series converge?

a) e^x

b) $\frac{1}{1-x}$

c) $\sin x$

d) $\ln(1+x)$

e) $x^4 - 2x^3 - 5x + 4$

Problem 2: Find Taylor polynomial $T_3^{\sin,\pi}$.

Problem 3: Estimate $\sqrt{0,98}$ and $\ln 1,2$. (You don't need to estimate the error.)

Problem 4: Estimate $\sin 0,1$ using Taylor polynomial of degree 3 at 0. Has this estimate precision to three decimal places?

Problem 5: Using Taylor polynomial, find limits

a) $\lim_{x\to 0} \frac{\ln(1+x)}{x}$

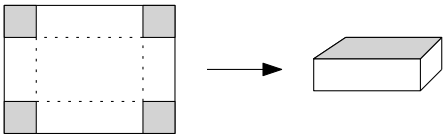
b) $\lim_{x\to 0} \frac{\cos x - e^{-\frac{x^2}{2}}}{x^4}$

Mathematical analysis II — Homework 1

Due: 9:00, 27.2.2019

Write your solution of each problem on a separate sheet of paper of format A4, without torn edges. One part will be marked for credit.

Problem 1: You have an sheet of paper of size A4 (210 by 297 millimetres) and you want to fold a box without a lid (a rectangular cuboid without one face) out of it. What is the maximal possible volume of the box?



Problem 2: Using Taylor polynomial, find approximate value of $\sqrt[5]{1,1}$ with precision to three decimal places, justify the precision of your result.

Problem 3: Using Taylor polynomial, find limit $\lim_{x\to 0} \frac{\sin x - \tan x}{x^3}$.

Problem 4: Find Taylor series of given functions at 0 and determine when they converge.

a) $\frac{1}{1+x}$

b) $\cos 3x$